

Application. No. : 10/022,297  
Filing Date : December 12, 2001  
Amendment Date : December 22, 2003  
Office Action Date : September 25, 2003

## AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of the claims and any prior listing of the claims in the present application. The listing of claims present each claim with its respective status shown in parentheses. Only those claims being amended herein show their changes in highlighted form, wherein insertions appear as underlined text (e.g., insertions) while deletions appear as strikethrough text (e.g., ~~deletions~~) or double-bracketed text (e.g., [[deletions]]). All original claims and previously presented claims appear as clean text.

Claims 2, 3, 17 and 27-32 were previously canceled.

Claims 1, 5-12, 18, 23 and 24 are canceled herein.

Claims 4, 13, 14, 16, 19 and 20 are amended herein.

Claims 15, 21, 22, 25 and 26 remain as originally filed or as previously amended.

Claims 33-37 are added herein.

### Listing of Claims

#### Claims 1-3 (Canceled)

**Claim 4** (Currently Amended) A semiconductor device comprising ~~[[a]]~~ an aluminum substrate, ~~the substrate comprising aluminum;~~ a copper land formed on the substrate, a semiconductor chip mounted on the land, a solder layer only through which the semiconductor chip is joined with the land, and ~~[[a]]~~ an epoxide synthetic resin, ~~covering the land, the solder layer and the semiconductor chip on the substrate;~~ the epoxide synthetic resin having a coefficient of expansion of the synthetic resin being generally less than approximately 23 ppm/°K and generally greater than the coefficient of expansion of the copper land, a coefficient of expansion of aluminum the epoxide synthetic resin covering the land, the solder layer, and the semiconductor chip.

#### Claim 5-12 (Canceled)

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**Claim 13** (Currently Amended) The semiconductor device as set forth in Claim [[1]] 4, wherein the semiconductor chip defines at least two corners positioned generally opposite to each other, the land has an outer boundary that defines at least two corner portions in proximity to the corners of the semiconductor chip, the outer boundary further defines contiguous portions extending next to the corner portions and spaced apart from the semiconductor chip more than the corner portions, and the corner portions of the land generally confine the corners of the semiconductor chip therein.

**Claim 14** (Currently Amended) The semiconductor device as set forth in Claim [[1]] 4, wherein the semiconductor chip controls electric power.

**Claim 15** (Original) The semiconductor device as set forth in Claim 14, wherein the semiconductor chip controls power of an electric motor arranged to drive an electric vehicle.

**Claim 16** (Currently Amended) A semiconductor device comprising a substrate, a land formed on the substrate, a semiconductor chip mounted on the land, and a solder layer joining the semiconductor chip with the land, the semiconductor chip defining at least two having a shape generally defined by at least first and second corners positioned generally diagonally opposite to each other, the semiconductor chip having an area defined by the shape, the land having an area defined by an outer boundary, the area of the land greater than the area of the semiconductor chip, the outer boundary of the land defining at least two first and second corner portions disposed in proximity to the first and second corners of the semiconductor chip, the outer boundary of the land further defining contiguous portions extending next to the corner portions, [[and]] the outer boundary at the contiguous portions spaced apart from the semiconductor chip more than the outer boundary at the corner portions, the first and second corner portions of the land generally confining the first and second corners of the semiconductor chip therein, the area of the land generally expanding from the corners of the semiconductor chip such that

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the area of the land in the contiguous portions is greater than the area of the land in the first and second corner portions.

**Claims 17-18** (Canceled)

**Claim 19** (Currently Amended) The semiconductor device as set forth in Claim [[18]] 16, wherein the shape of the semiconductor chip defines four is further defined by third and fourth corners positioned diagonally opposite each other, and wherein the outer boundary of the land further defines four third and fourth corner portions corresponding positioned proximate to the third and fourth corners of the semiconductor chip.

**Claim 20** (Currently Amended) The semiconductor device as set forth in Claim [[18]] 16, wherein the semiconductor chip is generally configured as a rectangular shape, and wherein at least a length of a shorter side of the rectangular shape is longer than approximately 2.5 millimeters.

**Claim 21** (Previously Presented) The semiconductor device as set forth in Claim 16, wherein the land is generally configured as a rectangular shape except for the corner portions.

**Claim 22** (Previously Presented) The semiconductor device as set forth in Claim 16, wherein the land is generally configured as a round shape except for the corner portions.

**Claims 23-24** (Canceled)

**Claim 25** (Original) The semiconductor device as set forth in Claim 16, wherein the semiconductor chip controls electric power.

**Claim 26** (Original) The semiconductor device as set forth in Claim 16, wherein the semiconductor chip is joined with the land in a reflow soldering method.

**Claims 27-32** (Canceled)

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**Claim 33** (New) A method of manufacturing a semiconductor device comprising:

providing a semiconductor chip having a shape generally defined by at least first and second corners positioned generally diagonally opposite to each other and by sides extending from the first and second corners, the semiconductor chip having an area defined by the shape;

forming a copper land on an aluminum substrate, the land having an area defined by an outer boundary, the area of the land being greater than the area of the semiconductor chip, the outer boundary of the land defining at least first and second corner portions with contiguous portions extending next to the corner portions;

mounting the semiconductor chip and a solder layer on the copper land with the solder layer positioned between the copper land and the semiconductor chip, the semiconductor chip positioned with the first and second corners of the semiconductor chip in proximity to the first and second corner portions of the land and with the sides of the semiconductor chip positioned in proximity to the contiguous portions of the land such that the contiguous portions of the outer boundary of the land are spaced apart from the sides of the semiconductor chip more than the first and second corner portions of the outer boundary of the land are spaced apart from the first and second corners of the chip, the first and second corner portions of the land generally confining the first and second corners of the semiconductor chip therein, the spacing of the outer boundary of the land from the chip generally expanding from the corners of the semiconductor chip to provide an increased exposed area of the land proximate to the sides of the chip; and

securing the semiconductor chip to the copper land by reflowing the solder layer.

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**Claim 34** (New) The method of Claim 33, wherein the semiconductor chip is generally configured as a rectangular shape, and wherein at least a length of a shorter side of the rectangular shape is longer than approximately 2.5 millimeters.

**Claim 35** (New) The method of Claim 33, wherein the land is generally configured as a rectangular shape except for the corner portions.

**Claim 36** (New) The method of Claim 33, wherein the land is generally configured as a round shape except for the corner portions.

**Claim 37** (New) The method of Claim 33, wherein the semiconductor chip controls electric power.